PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

5/KW
5/18/02

In the Application of:

Robert H. Moffett

CASE NO.: CH2814 US NA

SERIAL NO.: 09/898,437

GROUP ART UNIT: 1724

FILED: 07/03/2001

EXAMINER: Peter Hruskoci

FOR: Phosphorus Reduction in Aqueous Streams

RULE 132 DECLARATION

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Robert H. Moffett, declare that:

I am a citizen of the United States of America residing in Landenberg, Pennsylvania;

I am the inventor of the above-identified application for US patent and have read the Office Action mailed April 2, 2002;

I received my B. S. degree in Chemical Engineering from Virginia Polytechnic Institute and State University in 1980, am currently employed by E. I. du Pont de Nemours & Company, and have been working in the area of water treatment and silica since 1990,

as a result of my training and experience, I believe I am fully qualified to interpret various research results in the subject matter area; and

the runs described below were conducted either by me or under my supervision;

these runs were conducted using the procedures described in the Examples section of the present application;

CPAM is a cationic polymer (cationic polyacrylamide Percol® 7650 from Ciba Specialty Chemicals, Bazel, Switzerland) and APAM is an anionic polyacrylamide (Magnifloc 135GDL from Cytec, West Paterson, New Jersey);

wastewater having a pH of 6.9, a phosphorus content of 21.9 ppm, and a COD of 3190 ppm was obtained from a chicken processing site in Delaware and used as the source of phosphorus-contaminated water;

SiO2 used is a silica microgel MX solution as disclosed in the application (E.I. du Pont de Nemours and Company, Wilmington, Delaware);

detailed procedure is shown in the following table. Samples were allowed to settle for 2 minutes before sampling for P and COD measurements;

Run No.									
1	Action	add Zn	adj pH	stop mixer	sample				
	RPM	300	300	0	0				
	Time (sec)		start clock	30	150				
2	Action	add Zn	adj pH	slow mixer	stop mixer	sample			
	RPM	300	300	0	0	0			
	Time (sec)		start clock	60	105	225			
3	Action	add Zn	adj pH	add SiO2	add CPAM	slow mixer	stop mixer	sample	
	RPM	300	300	300	300	150	0	0	
	Time (sec)		start clock	30	45	60	105	225	
4	Action	add Ti	adj pH	stop mixer	sample				
	RPM	300	300	0	0				
	Time (sec)		start clock	30	150				
5	Action								
	RPM	add Ti	adj pH	Slow mixer	stop mixer	sample			
	Time (sec)	300	300	0	0	0			
			start clock	75	120	240			
6	Action								
	RPM	add Ti	adj pH	add SiO2	add CPAM	add APAM	slow mixer	stop mixer	
	Time (sec)	300	300	300	300	300	150	0	0
			start clock	30	45	60	75	120	240
7	Action	add Zr	adj pH	stop mixer	sample				
	RPM	300	300	0	0				
	Time (sec)		start clock	30	150				
8	Action	add Zr	adj pH	slow mixer	stop mixer	sample			
	RPM	300	300	0	0	0			
	Time (sec)		start clock	75	120	240			
9	Action	add Zr	adj pH	add SiO2	add CPAM	add APAM	slow mixer	stop mixer	sample
	RPM	300	300	300	300	300	150	0	0
	Time (sec)		start clock	30	45	60	75	120	240

the results are shown in the table below;

Run No.	ppm Zn as $ZnCl_2$	ppm Ti as $TiOSO_4$	ppm Zr as $Zr(SO_4)_2$	pH adj. To	pH adj. with	SiO_2 ppm	CPAM ppm	APAM ppm	final pH	total P ppm	total COD ppm
1	10	-	-	9.5	CaO	-	-	-	9.7	17.7	>1650
2	10	-	-	9.5	CaO	-	-	-	9.7	17.6	>1650
3	10	-	-	9.5	CaO	100	12	-	9.6	2.4	592
4	-	20	-	4.9	H_2SO_4	-	-	-	4.8	>17.9	>1650
5	-	20	-	4.9	H_2SO_4	-	-	-	4.9	>17.9	>1650
6	-	20	-	4.9	H_2SO_4	100	10	4	4.9	6.4	456
7	-	-	20	4.9	H_2SO_4	-	-	-	4.9	17.1	>1650
8	-	-	20	4.9	H_2SO_4	-	-	-	4.9	16.1	>1650
9	-	-	20	4.9	H_2SO_4	100	10	4	5.0	5.6	441

the results show that the addition of ZnCl2 at an alkaline pH as disclosed by Allgulin does not appreciably reduce the P concentration or COD. However, after the addition of Zn ions and pH adjustment the addition of an anionic colloid and a flocculant (run 3), as recited in the claimed invention, P concentration was reduced by almost 90% and COD was reduced by over 80%; addition of an anionic colloid and a flocculant following the pH adjustment and Zn addition (run 3) as recited in the claimed invention, is required to significantly reduce the P concentration and COD;

the results also show that the pH with an acid to the acidic region followed by addition of a titanium salt or a zirconium salt as disclosed in Ayukawa (run 5 or 8) did not appreciably reduce the P concentration or COD. Addition of an anionic colloid and a flocculant following the pH adjustment and Ti or Zr addition (runs 6 and 9) as recited in the claimed invention, is necessary to significantly reduced the P concentration and COD; and

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Robert H. Moffett 4/30/02

ROBERT H. MOFFETT DATE

PTO/SB/92 (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Certificate of Mailing under 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

Assistant Commissioner for Patents
Washington, D.C. 20231

on May 1, 2002 .
Date

Barbara A. Ferzetti
Signature

BARBARA A. FERZETTI
Type or printed name of person signing Certificate

Note: Each paper must have its own certificate of mailing, or this certificate must identify each submitted paper.

09/898,437
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Amendment
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